COURSE OUTLINE NEW TECHNOLOGIES & EDUCATIONAL TECHNIQUES IN RISK AND DISASTER MANAGEMENT - INTELLIGENT DECISION SUPPORT SYSTEMS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING
DEPARTMENT	PREVENTION AND MANAGEMENT OF CRISIS AND DISASTERS: INNOVATIVE TECHNIQUES IN CIVIL PROTECTION
LEVEL OF STUDIES	ISCED level 7 – Master's or equivalent level
COURSE CODE	CP09 **SEMESTER** 2nd Semester
COURSE TITLE	New Technologies & Educational Techniques in Risk and Disaster Management - Intelligent Decision Support Systems

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	TEACHING HOURS PER WEEK	ECTS CREDITS
	3	6
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	Greek, English
COURSE OFFERED TO ERASMUS STUDENTS:	YES
COURSE URL:	https://eclass.duth.gr/courses/

2. LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

Upon completion of the course, the student will be able to:
- *Understand the capabilities of intelligent decision support systems in civil protection.*
- *Design and develop specialized DSS for addressing specific problems.*
- *Evaluate the effectiveness of existing DSS and propose improvements.*
- *Contribute to the development of innovative solutions for crisis and disaster prevention and management.*
- *Understand the unique cyber threats that intensify during crises and disasters, as well as their potential impact on humanitarian aid, critical infrastructure, and social cohesion.*
- *Recognize the potential of new technologies in civil protection education.*
- *Design and implement innovative educational programs.*
- *Evaluate the effectiveness of various educational methods.*

- *Contribute to the development of more effective training systems for risk and disaster management.*

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,	*Project design and management*
ICT Use	*Equity and Inclusion*
Adaptation to new situations	*Respect for the natural environment*
Decision making	*Sustainability*
Autonomous work	*Demonstration of social, professional and moral*
Teamwork	*responsibility and sensitivity to gender issues*
Working in an international environment	*Critical thinking*
Working in an interdisciplinary environment	*Promoting free, creative and inductive reasoning*
Production of new research ideas	

Search, analysis, and synthesis of data and information, using the necessary technologies

Adaptation to new situations

Autonomous work

Teamwork

Adaptation to new situations

Decision making

3. COURSE CONTENT

1. The Challenges of Civil Protection Education:
   - The importance of education for strengthening the resilience of societies.
   - The limitations of traditional education methods.
   - The need for innovative approaches.
2. New Technologies in Education:
   - Virtual and augmented reality (VR/AR).
   - Artificial intelligence and learning.
   - Collaborative tools and learning platforms.
   - Applications and games.
3. Applications of New Technologies in Civil Protection Education:
   - Disaster simulations and emergency scenarios.
   - First aid and search and rescue training.
   - Public awareness of risks and prevention measures.
   - Development of leadership and collaboration skills.
4. Design and Implementation of Innovative Educational Programs:
   - Development of educational scenarios and activities.
   - Selection of appropriate technological tools.
   - Evaluation of the effectiveness of educational programs.
5. Future Prospects and Trends:
   - The latest developments in civil protection education.
   - The challenges and opportunities presented.
6. Introduction to Intelligent Decision Support Systems:
   - Basic concepts and definitions.
   - Historical overview and evolution of DSS.
   - Types of DSS (database, model, knowledge-based).
7. Cutting-Edge Technologies in DSS:
   - Artificial intelligence (AI) and machine learning (ML).

- o Big Data analytics.
- o Geographic information systems (GIS).
- o Modeling.
8. Applications of DSS in Civil Protection:
   - o Risk and vulnerability assessment.
   - o Disaster prediction and early warning.
   - o Emergency planning and resource management.
   - o Post-disaster recovery.
   - o Real-time decision support.
9. DSS Design and Development:
   - o DSS development process.
   - o Selection of appropriate technology.
   - o System architecture design.
   - o Integration of knowledge and expertise.
10. DSS Evaluation and Optimization:
    - o Criteria for evaluating DSS effectiveness.
    - o Evaluation methods.
    - o DSS optimization based on evaluation results.
11. Cyber Threats and Intelligent Decision Support Systems in Crisis Situations:
    - o How cyberattacks can exploit vulnerabilities created during crises.
    - o Critical infrastructure (energy, health, transport), communication systems, humanitarian aid systems.
    - o Types of attacks: Ransomware, DDoS, phishing, disinformation.
    - o How cyberattacks can exacerbate the consequences of a crisis.
    - o Economic impacts: Recovery costs, loss of income.
    - o Social impacts: Spread of fake news, undermining trust in government authorities.
    - o Collaboration between cybersecurity and crisis management: The importance of integrating cybersecurity into disaster response plans.
    - o Development of models for predicting future attacks.
12. Internet of Things and Hardware System Technologies for Crisis and Disaster Impact Management:
    - o Response automation: Using robots to perform repetitive security tasks.
    - o Tools and platforms for cybersecurity incident management:
    - o SIEM (Security Information and Event Management): Collection, analysis, and correlation of security data.
    - o SOAR (Security Orchestration, Automation, and Response): Automation of threat detection and response processes.
    - o IoT, Edge Computing, Computer Systems and Networks
13. Ethical dilemmas and challenges in the application of intelligent systems:
    - o Privacy: Protection of personal data.
    - o Responsibility: Who is responsible in case of system failure?
    - o Reliability: How can we ensure that systems make correct decisions?

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to face, Distance learning
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in*	Use of ICT in Teaching and Communication with students digital slides videos

Laboratory Education, in Communication with students	MsTeams/e-class, webmail

TEACHING ORGANIZATION	Activity	Workload/semester
The ways and methods of teaching are described in detail.	Lectures	39
Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.	Essay	60
	Study	78
	Examinations	3
	Total	**180**
The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.		

STUDENT EVALUATION	
Description of the evaluation process	Student evaluation languages
	Greek
	English
Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others	Method (Formative or Concluding)
	Summative
	Student evaluation methods
	Written Exam with Problem Solving 50%
	Teamwork project 50%
Please indicate all relevant information about the course assessment and how students are informed	

5. SUGGESTED BIBLIOGRAPHY

Ι. Βλαχάβας, Π. Κεφαλάς, Ν. Βασιλειάδης, Φ. Κόκκορας, Η. Σακελλαρίου. Τεχνητή Νοημοσύνη - Δ Έκδοση, Εκδόσεις Πανεπιστημίου Μακεδονίας, ISBN: 978-618-5196-44-8, 2020.

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